Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Quantitative Statistics Activity

HELLO, and WELCOME TO WALMART!!!

Having experienced the learning experience that is IMMACULATA WEEK, you've been hired by everyone's favorite retailer to aid in the analysis of business practices during the holiday season.

Without doubt, the Holiday season brings a tremendous number of customers to the store, but more customers might mean a longer wait in line, and the potential for fights over trivial items, such as Tickle-Me-Elmo. The data in the following table provide information about 6 weekends during the Holiday season.

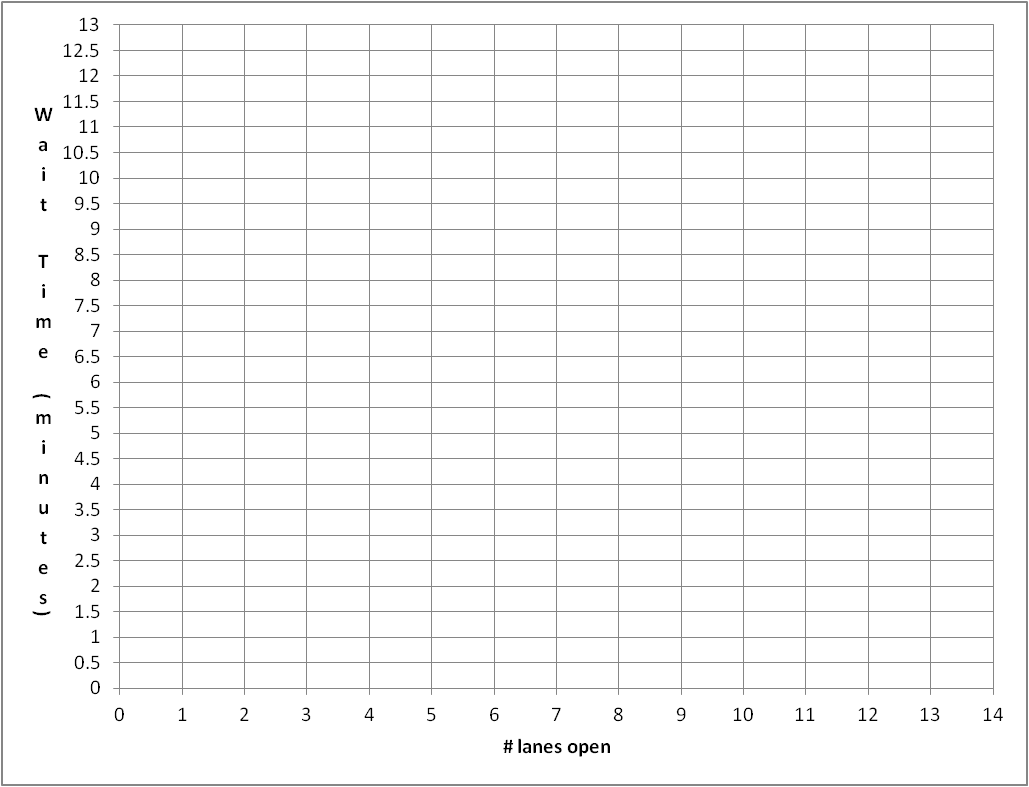
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Nov. 22 | Nov. 23 | Nov. 29 | Nov. 30 | Dec.  6 | Dec.  7 | Dec. 14 | Dec. 15 | Dec. 21 | Dec. 22 | Dec. 29 | Dec. 30 |
| Weather | Sun | Cloudy | Sun | Rain | Sun | Sun | Cloudy | Cloudy | Cloudy | Rain | Snow | Sun |
| # Lanes open | 5 | 12 | 11 | 7 | 12 | 8 | 6 | 10 | 8 | 6 | 4 | 8 |
| Avg. Wait time  (Min.) | 12.2 | 4.2 | 4.4 | 6.75 | 3.8 | 5.75 | 10.4 | 6.5 | 6.25 | 9.2 | 1.1 | 5.6 |

As you can see, On Saturdays and Sundays of the Holiday season, Walmart opened a different number of checkout lanes for customers between the hours of 1 PM and 4 PM (its busiest times). The data includes the number of lines opened and the average wait time for a customer to go through a line and complete his/her transaction. You have been charged with determining the relationship between wait time in checkout lines and the number of lines that are open.

1. What is the explanatory variable?

2. What is the response variable?

3. Make a scatterplot of the data on the grid below.



4. There appears to be a clear OUTLIER on the scatterplot. Circle it. Give a reason that would justify eliminating the outlier in your data analysis.

5. Now, use your calculator, EXCEL, or an app on your IPAD to generate the equation of the regression line for this data (remember, to exclude the outlier!!) Write your result with 3 decimal points.

6. Interpret the meaning of the y intercept in the context of the problem.

7. Interpret the meaning of the slope in the context of the problem.

8. Now use your calculator, EXCEL, or an app on your IPAD to calculate the correlation, r.

9. Interpret the value of r.

10. What is the predicted average waiting time if Walmart opens 9 lanes?

11. What is the predicted wait time if Walmart opens 7 lanes?

12. What is the difference between the actual waiting time and the predicted waiting time for 7 lanes?

13. If Walmart decides that it wants its customers to wait no longer than 4.5 minutes, how many lanes should it open?

14. If Walmart decides that it wants its customers to wait no longer than 10 minutes, how many lanes should it open?

15. What is the predicted average waiting time if Walmart opens only 1 lane?

16. What is the predicted average waiting time if Walmart opens 20 lanes?

17. Why do the answers to #15 and #16 make little sense for this problem?

EXTENSION ACTIVITY

Oh NO!! On days when the wait time is long, customers are throwing SNICKERS bars at one another!! This waste of perfectly good chocolate must be stopped!! So, using your data analysis skills, Walmart will hire extra staff to man the checkout lanes. Obviously, they will have to pay out more money for the workers. The chart below has been amended to show the original data along with the extra money that will be paid out on specific days.

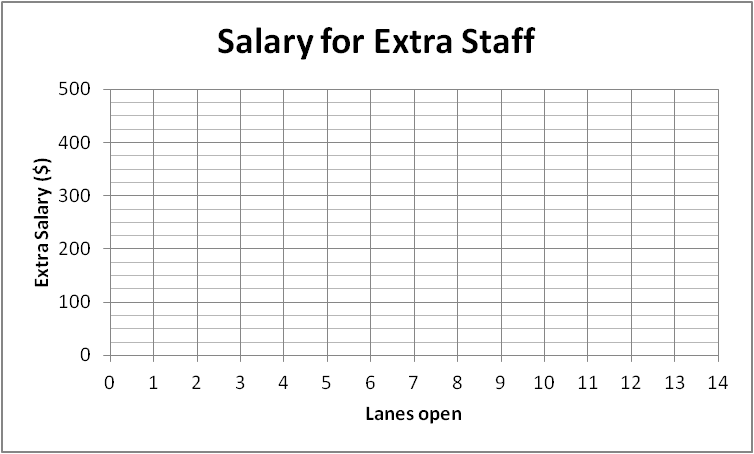
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Nov. 22 | Nov. 23 | Nov. 29 | Nov. 30 | Dec.  6 | Dec.  7 | Dec. 14 | Dec. 15 | Dec. 21 | Dec. 22 | Dec. 29 | Dec. 30 |
| Weather | Sun | Cloudy | Sun | Rain | Sun | Sun | Cloudy | Cloudy | Cloudy | Rain | Snow | Sun |
| # Lanes open | 5 | 12 | 11 | 7 | 12 | 8 | 6 | 10 | 8 | 6 | 4 | 8 |
| Avg. Wait time  (Min.) | 12.2 | 4.2 | 4.4 | 6.75 | 3.8 | 5.75 | 10.4 | 6.5 | 6.25 | 9.2 | 1.1 | 5.6 |
| Salary for Extra Staff  ($) | 213 | 451 | 444 | 256 | 498 | 301 | 229 | 364 | 291 | 253 | xxxx | 320 |

You have been charged with determining the relationship between wait time in number of lanes open and the amount of extra money spent.

1. What is the explanatory variable?

2. What is the response variable?

3. Make a scatterplot on the grid below



4. Now, use your calculator, EXCEL, or an app on your IPAD to generate the equation of the regression line for this data. Discard the day where there is no salary for extra staff, so you'll only have 11 data points. Write your result with 3 decimal points.

5. Interpret the meaning of the y intercept in the context of the problem.

6. Interpret the meaning of the slope in the context of the problem.

7. Now use your calculator, EXCEL, or an app on your IPAD to calculate the correlation, r.

8. Interpret the value of r.

9. What is the predicted extra salary if Walmart opens 9 lanes?

10. What is the predicted extra salary if Walmart opens 7 lanes?

11. What is the difference between the actual extra salary and the predicted extra salary for 7 lanes?

12. If Walmart decides that it wants to pay no more than $500 in extra salary, find the maximum number of lanes that it can open.

13. If Walmart decides that it wants to pay no more than $2500 in extra salary, find the maximum number of lanes that it can open.

14. What is the predicted amount of extra salary if Walmart opens no lanes?

15. What is the predicted amount of extra salary if Walmart opens 50 lanes?

16. Why do the answers to #14 and #15 make little sense for this problem?

17. The poor Walmart manager needs to make a decision about how many lanes to open. Based on the data and your analysis, explain the dilemma that he has in making a decision.